

ineffective signal in data reading, while the disk rotating frequency received by the position detector 40 along with the frequency variation of the phase lock loop to show the frequency of the phase lock loop unchanged. Furthermore, as the tracking operation is stopped, an effective pick-up head ready signal is output.

[0030] Referring to Fig. 4B, a position condition detecting unit 41 on the control circuit for controlling the optic pick-up head of the optic disk drive to read is illustrated. The position condition-detecting unit 41 receives a FRAMESYNC signal and the FODR signal. After processing in the position condition detecting unit 41, the position signal of the optic pick-up head is output. Furthermore, a pick-up head ready signal along with the output of the position detector 40 is used for determining the position of the optic pick-up head. The position condition detecting unit 41 receives the FRAMESYNC and the FODR signals and then an optic pick-up head position signal is output. Before the position condition detecting unit 41 outputs an effective optic pick-up head position signal, an effective pick-up head ready signal is output from the position detector 40. Otherwise, the optic pick-up head position signal output from the position condition detecting unit 41 is ineffective.

[0031] Referring to Fig. 4C, the inner circuit block diagram of the position condition detecting unit 41 is illustrated. In that, a counting unit 411 receives a FRAMESYNC signal and a FODR signal, then FRAMESYNCS per FODR is counted and output. The FRAMESYNCS per FODR means the number of the FRAMESYNCS as the compact disk rotates one cycle.

[0032] The position counting unit 412 receives the optic pick-up head position signal, and then the number of the FRAMESYNCS in the section is output. Each section has the upper limit and lower limit with respect to the number of the FRAMESYNC. After the position counting unit 412 receives the optic pick-up head position signal, through the relation of the optic pick-up head position with respect to the section, an upper limit and a lower limit of the number of FRAMESYNC signal in the section are output.

[0033] The comparing unit 413 receives the FRAMESYNC per FODR and the upper and lower limits of the number of the FRAMESYNCS and then compares for outputting the optic pick-up head position signal. Then

the optic pick-up head position signal is fed back to the position counting unit 412. Aforesaid operation is performed cyclically for looking for a correcting optic pick-up head position.

[0034] The section about the position of the optic pick-up head is determined by detecting the movement and positioning of the optic pick-up head relative to optic disk and by the setting the sections in the compact disk. As above description, the division about each section is determined by the virtual setting of the data section in the compact disk, and each section has an upper limit and a lower limit. Therefore, the range of each section can be defined obviously.

[0035] Referring to Figs. 4C and 3B, if the FRAMESYNC per FODR and the FRAMESYNC are satisfied to a certain section in Fig. 3B, then the position of the optic pick-up head is determined to be in the section. For example, if the FRAMESYNC per FODR is equal to 122, then the current position of the optic pick-up head is 2 (in second section). Then the upper limit in second section is 97 and the lower limit is 84. Since  $122 > 97 > 84$ , namely, the position of the optic pick-up head is not at the second section. Then the position of the optic pick-up head is set at 3, and the following comparing operation is performed.

[0036] In the following cycle, the position of the optic pick-up head is set at 3 (at third section). The position counting unit 412 counts the upper limit 106 and the lower limit 93 in the third section. Then, these messages are entered into the comparing unit 413 for comparing. Since  $122 > 103$ , it is not in the third section. Then the position of the optic pick-up head is set at 4, and the following comparing operation is executed. The process is performed repeated until the position of the optic pick-up head is set at 5. After compared by the comparing unit 413, 122 is between the 124 and 111. Therefore, the optic pick-up head is at the fifth section, and the position of the optic pick-up head is determined.

[0037] With reference to Fig. 5, the signal waveforms of Fig. 4A are illustrated. When the frequency variation of the phase lock loop is at 0 (low level), it represents that no change occurs in the frequency of the phase lock loop. While as it is at 1 (high level), it represents that the frequency of the phase lock loop is unsteady. When the track on success (TOS) signal is 1, it

represents that the track seeking is successful. If it is 0, the track on succeeding searching is not successful. The FODR represents the frequency of disk rotation. If the pick-up head ready (PUHRDY) is 1, it represents the optic pick-up head to be ready in position, while when the pick-up head ready is 0, it represents that a correct position is not found.

[0038] The cycle of the PUHRDY is correspondent to that of the FODR, while the condition of the PUHRDY is updated per cycle. The updated result is determined by the conditions of the FA and the TOS. The FA and TOS serve to assert whether the position of the optic pick-up head is ready.

10      If FA is 1 or TOS is 0, it represents that the position of the optic pick-up head is not ready, and therefore, the PUHRDY in next cycle is 0. With reference to Fig. 5, in the k + 1 cycle, the PUHRDY is 0 because in the k cycle, the FA is 1. In the k + 3 cycle, the PUHRDY is also 0 because in the k + 2 cycle, the TOS is 0.

15      [0039] By the aforesaid position detector 40 and the position condition detecting unit 41 and the virtual division of the disk, the position of an optic pick-up head in a compact disk can be found rapidly. In practical applications, the present invention is not confined to the aforesaid division of a disk, namely, the virtual setting of sections in a disk and the related 20 comparing process can be modified according to the capacity of a disk or the structure of the disk so that under a proper control circuit, the user may perform a preferred division so as to achieve the same object.

[0040] In the invention the disk can be implemented by, for example, CD, DVD and other optical storage media.

25      [0041] The present invention is thus described; it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.